CHANGES IN THE LEVELS OF PLASMA TRANS-FATTY ACIDS REFLECT CHANGES IN DIETARY INTAKE

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Trans-fatty acids (*trans*-FA) from partially hydrogenated vegetable oil have been shown to elevate human plasma LDL-cholesterol and to decrease HDL-cholesterol (Mensink and Katan 1990). *Trans*-FA also elevate plasma lipoprotein (a) (Mensink et al. 1992; Nestel et al. 1992) which is thought to be an independent risk factor for atherosclerosis and coronary heart disease. In an epidemiological study conducted by Willet et al. (1993), *trans*-FA from partially hydrogenated vegetable oil were significantly associated with increased risk of coronary heart disease.

Although we have recently published the *trans*-FA content of many Australian margarines, butter/dairy blends and animal fats (Mansour and Sinclair 1993), the *trans*-FA content of other foods is not known. Thus there is a need to develop accurate methods to estimate the dietary intake of *trans*-fatty acids in order to assess whether the consumption of these levels pose significant health consequences. The aims of this experiment were to see whether subjects who were consuming *trans*-FA from margarine would have measurable levels in their plasma and to quantitate the individual *trans*-FA isomers in the various plasma lipid classes such as phospholipids (PL), triglycerides (TG), free fatty acids (FFA) and cholesteryl esters (CE).

Ten mildly hypercholesterolaemic subjects were recruited into a study comprising three, three-week-dietary-periods. The first was the baseline diet. The second was a lean-meat diet with 25% of energy from total fat. Olive oil provided 7.5% of total energy and another 7.5% energy came from an olive-oil-based margarine (Brio). The third was a lean-meat diet without added fat (10% energy from total fat). Blood was collected at the end of the second and third weeks of each dietary period and aliquots of plasma were extracted into chloroform/methanol and the lipid classes separated on silica gel. The fatty acids were then methylated and analysed by capillary gas-liquid chromatography.

The PL fraction contained more than 50% of the *trans*-FA isomers in the plasma lipids in all subjects. Baseline plasma levels of total *trans*-FA, PL *trans*-FA, TG *trans*-FA, FFA *trans*-FA and CE *trans*-FA varied between 11-69μg/mL, 7-36μg/mL, 2-28μg/mL, 1-5μg/mL and 1-5μg/mL respectively. Changes in *trans*-FA intake were positively correlated with changes in the *trans*-FA content of total plasma lipids, PL, TG and FFA but not the CE fraction.

Plasma phospholipid *trans*-FA may therefore be a useful index of the dietary intake of *trans*-FA. The plasma content of vaccenic acid (Δ11-*trans* 18:1) which is the major *trans*-FA isomer found in ruminant fats but not in margarine may be used to estimate the proportion of ruminant fat contributing to the diet.

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